Evidence for (galactose)-binding lectins binding to C-fibres

Notes

- ***IB4 binds to terminal galactose, is exemplified in the patent as analgesic, and continues to be the most exemplified lectin-binding event in the literature.***

ELSEVIER
FULL-TEXT ARTICLE

Tetrodotoxin-sensitive and -resistant Na+ channel currents in subsets of small sensory neurons of rats.

Wu ZZ, Pan HL. Brain Res. 2004 Dec 17;1029(2):251-8.

Department of Anesthesiology, The Pennsylvania State University College of Medicine, 500 University Drive, The Milton S. Hershey Medical Center, Hershey, PA 17033-0850, USA.

Voltage-activated Na+ channels in the primary sensory neurons are important for generation of action potentials and regulation of neurotransmitter release. The Na+ channels expressed in different types of dorsal root ganglion (DRG) neurons are not fully known. In this study, we determined the possible difference in tetrodotoxin-sensitive (TTX-S) and -resistant (TTX-R) Na+ channel currents between isolectin B4 (IB4)-positive and IB4-negative small DRG neurons. Whole-cell voltage- and current-clamp recordings were performed in acutely isolated DRG neurons labeled with and without IB4 conjugated to Alexa Fluor 594. The peak Na+ current density was significantly higher in IB4-negative than IB4-positive DRG neurons. While all the IB4-negative neurons had a prominent TTX-S Na+ current, the TTX-R Na+ current was present in most IB4-positive cells. Additionally, the evoked action potential had a higher activation threshold and a longer duration in IB4-positive than IB4-negative neurons. TTX had no effect on the evoked action potential in IB4-positive neurons, but it inhibited the action potential generation in about 50% IB4-negative neurons. This study provides complementary new information that there is a distinct difference in the expression level of TTX-S and TTX-R Na+ channels between IB4-negative than IB4-positive small-diameter DRG neurons. This difference in the density of TTX-R Na+ channels is responsible for the distinct membrane properties of these two types of nociceptive neurons.

PMID: 15542080 [PubMed - indexed for MEDLINE]

ELSEVIER
FULL-TEXT ARTICLE

The behavioral and neuroanatomical effects of IB4-saporin treatment in rat models of nociceptive and neuropathic pain.

Tarpley JW, Kohler MG, Martin WJ. Brain Res. 2004 Dec 10;1029(1):65-76.

Department of Pharmacology, Merck Research Laboratories, PO Box 2000, Rahway, NJ 07065, USA.

One distinguishing feature of primary afferent neurons is their ability to bind the lectin IB(4). Previous work suggested that neurons in the inner part of lamina II (IIi), onto which IB(4)-positive sensory neurons project, facilitate nociceptive transmission following tissue or nerve injury. Using an IB(4)-saporin conjugate (IB(4)-SAP), we examined the contribution of IB(4)-positive neurons to nociceptive processing in rats with and without nerve injury. Intrasciatic injection of IB(4)-SAP (5 mug/5 mul) significantly decreased IB(4)-labeling and immunoreactive P(2)X(3) in the spinal cord and delayed the behavioral and neuroanatomical consequences of L5 spinal nerve ligation (SNL) injury. In the absence of injury, thermal and mechanical nociceptive thresholds increased 2 weeks post-treatment only in IB(4)-SAP-treated, but not control (saline or saporin only), rats. Acute NGF-induced hyperalgesia was also attenuated following IB(4)-SAP treatment. In the SNL model, mechanical allodynia failed to develop 1 and 2 weeks post-injury, but was fully established by 4 weeks. Moreover, neuropeptide Y immunoreactivity (NPY-ir), which increases in the spinal cord after nerve

injury, was unchanged in IB(4)-SAP-treated animals whereas immunoreactive PKCgamma decreased 2, but not 4, weeks post-injury. Quantitative RT-PCR revealed a reduction in P(2)X(3) mRNA in L4 DRG of IB(4)-SAP-treated animals, but no change in TrkA expression. Our results suggest that IB(4)-positive neurons in L4 are required for the full expression of NGF-induced hyperalgesia and participate in the behavioral and anatomical consequences that follow injury to the L5 spinal nerve.

PMID: 15533317 [PubMed - indexed for MEDLINE]

Analysis of the distribution of binding sites for the plant lectin Bandeiraea simplicifolia I-isolectin B4 on primary sensory neurones in seven mammalian species.

Gerke MB, Plenderleith MB. Anat **Rec. 2002 Oct 1;268(2):105-14.**

Neuroscience Laboratory, School of Life Sciences, Queensland University of Technology, Brisbane, Queensland 4001, Australia.

The purpose of the present study was to investigate the binding patterns of the plant lectin Bandeiraea simplicifolia I-isolectin B(4) (BSI-B(4)) to sensory neurones in seven mammalian species. The dorsal root ganglia and spinal cords of three rats, mice, guinea pigs, rabbits, flying foxes, cats, and marmoset monkeys were screened for BSI-B(4) using lectin histochemistry. BSI-B(4) binding was associated with the soma of predominantly small-diameter primary sensory neurones in the dorsal root ganglia and their axon terminals within laminae I and II of the superficial dorsal horn in all seven species. The similarities of lectin binding patterns in each of these species suggest that the glycoconjugate to which BSI-B(4) binds has a ubiquitous distribution in mammals, and supports the proposal that this lectin may preferentially bind to a subpopulation of sensory neurones with a similar functional role in each of these species.

PMID: 12221716 [PubMed - indexed for MEDLINE]